Non Destructive Testing of Body Armor Plates for Structural Integrity

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Body Armor Plate

Strike face
Component to be tested

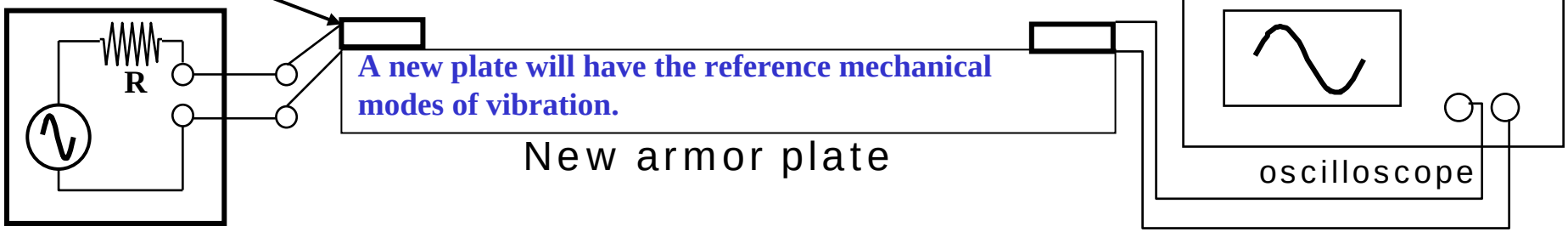
The outer plate is the strike plate and is what we are going to test the structural integrity of.

Proof-of-principle method – future field units will be MEM based

Principle: An AC voltage will cause the piezoelectric transducer to vibrate and this vibration when coupled to the material being tested will excite a resonant mode in the plate which can then be measured by another transducer.

Output voltage from the transducer caused by the mechanical oscillation of the plate will be used as the standard for comparison.

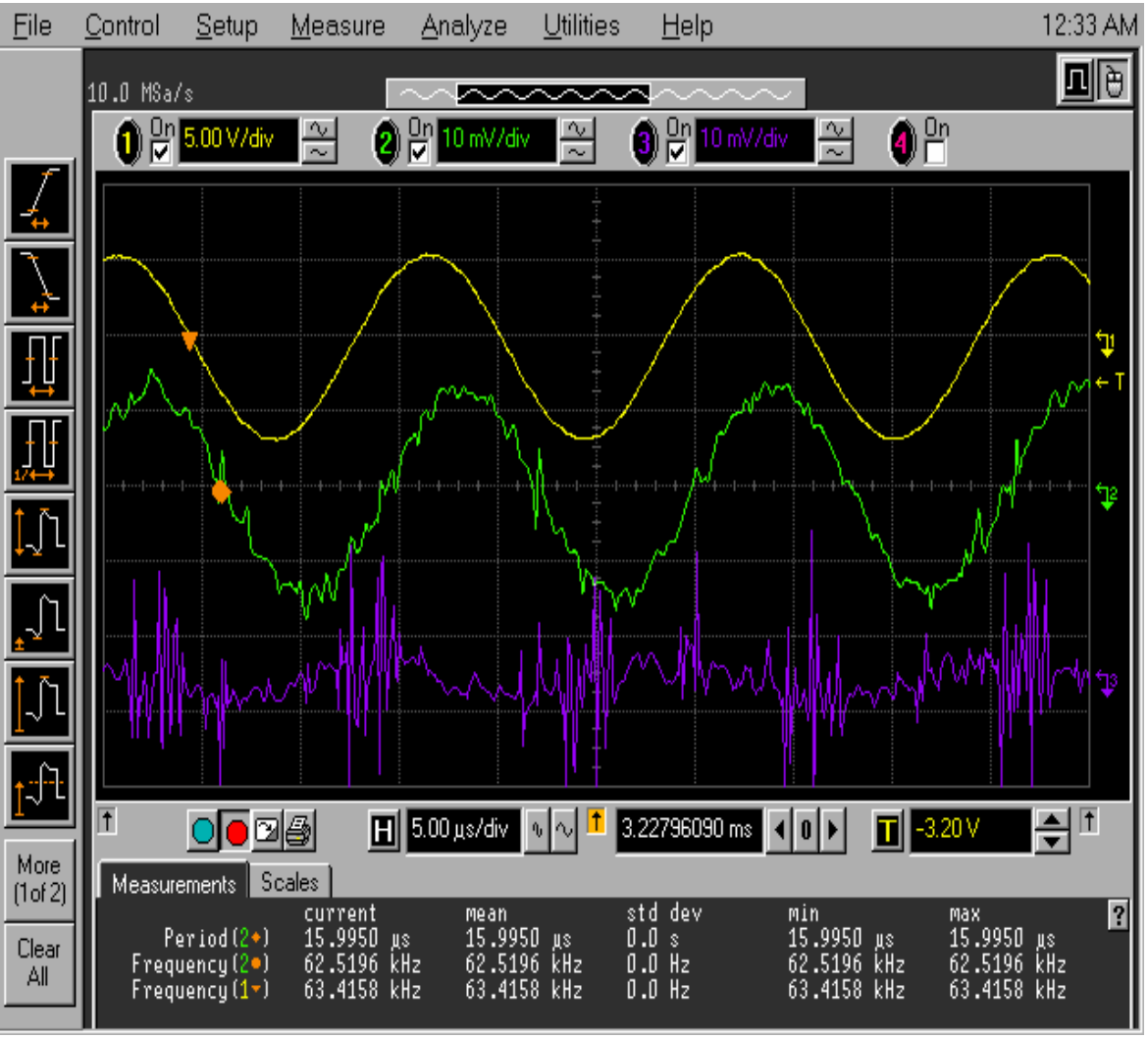
Various input voltage signals excite the transducer and are coupled to the plate



Different mechanical modes of vibration indicated by a different output wave form.

This test configuration will show a profound change of the amplitude of the transmission signal if the plate is cracked.

Damaged and undamaged plate fundamental harmonic



Signal 1 = driving signal of transducer

Signal 2 = resonant vibration of undamaged plate

Signal 3 = resonant vibration of plate cracked and with one hole

X-ray images of plates